

# Designing Application Form of Controller of Salinity level at Seaweed Dike

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**Abstract**—this research aims at designing and making controller application of salinity level at seaweed dike. The method used was triangulation technique and this research was qualitative research. The result of the research is a design of prototyping form using arduino.

**Keywords**— arduino, seaweed, controller, salt dike

## I. INTRODUCTION

Seaweed is grown in farmers' dikes with plant once system for some times harvest. Its planting technique is also still traditional and it does not use modern technique yet, but seaweed is still world primadona as one of important material for making gelatin. Its ideal time to harvest is 2 months after planting.

Based on the result of observation, interview and survey to some locations, the researchers obtain data and infomation about farmers namely when there is rainy season with its high intensity, so it will influence the cultivation of seaweed. So that, it causes the seaweed will be attacked pest easilysuch as moss, small shellfish that can damage the quality of the seaweed, moreover when the level of salinity in the dike is very low, so it will cause the seaweed die. Therefore, it is needed a tool or system that can control the level of salinity at the seaweed dike.

## II. REVIEW OF LITERATURE

### A. Artificial Intelligence

Artificial intelligence is defined as scientific entity intelligence which is many used in some areas like Expert System, computer player (*Games*), Fuzzy Logic, Replica Nerve Network and Robotic because it is considered that computer can do human job. Some experts state about definition of artificial intelligence. But, the researchers conclude that Artificial Intelligence is a study which learns about how to make the computer does the job like human does.

### B. Arduino

Arduino is a tool/hardware used to connect the system and computer apparatus to enable for modifying the program that will be made. Type of microcontroller used by the researchers is AT Mega 328. AT Mega 328 on Arduino is available with a *Boodloader* that enable us to upload new code to AT Mega without using Eksternal Hardware programming.

### C. Application

Application is a system or a tool used to help or enable in operating computer by using specific programming language.

### D. Control

Control system is a tool (tools) used to control, order and arrange situation from a system.

### E. Level of Salinity

Based on opinion from some experts about salt and salinity, the researchers conclude that level of salinity of a substance in sea which can be determining factor of the quality of sea water for the life continuity of plants in the water.

### F. Unified Modeling Language (UML)

UML is a language used to determine, visualize, build, and document an information system. UML can be used to understand and document every information system. According to Rosa and Shalahuddin (2011:113), UML is one of language standard which is used in industrial world to define requirement, make analysis and design, as well as describe architecture in programming orientating to object. The diagrams used in this research are *usecase diagram, sequence diagram and class diagram*.

### G. Seaweed

Seaweed is a kind of algae which live in shallow water which can be used as material for gelatins, cosmetics and medicines. Kind of seaweed that the researchers research in this research is *Gracilaria*

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## III. RESEARCH METHODOLOGY

This research was qualitative with *research and development* method using quantitative approach to obtain as complete as possible about designing of application that would be made. Time of the research was about 2 months. Location of the research was seaweed dike at Desa Pompengan Kecamatan Lamasi Timur Palopo.

### A. Scope of the Research

This research is restricted to make it focus. It was focused on controller application designing of salinity level in dike with kind of seaweed was *Gracilaria*. Application used was

Arduino, it is Prototype and system designing using *United Modeling Language (UML)* approach.

**B. Technique of collecting data**

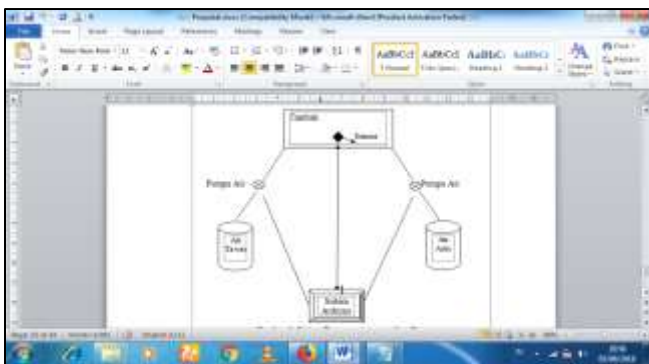
- **Observation.** The researchers conducted direct observation in cultivation activity of seaweed to find out cultivation process applied in dike.
- **Interview.** The researchers conducted direct interview to some dike farmers, harvest workers, and some seaweed entrepreneurs at Desa Pompengan Kecamatan lamasi timur Palopo. The result of interview from some seaweed farmers shows that they get problem when rainy season, the water in dike is lack of salinity level so it will influence the growing of seaweed.
- **Literature.** The researchers learned and collected data from literature related to tool that would be used, either from books or information from internet.

**C. Analysis of the Research**

The analysis is the farmers who are doing planting of seaweed seed. The farmers change the water without paying attention to the condition of water salinity if the level of salinity is high or low. It is the same as when the harvest time, the farmers give fertilizer before and after the harvest. By this case, the result of harvest depends on the process.

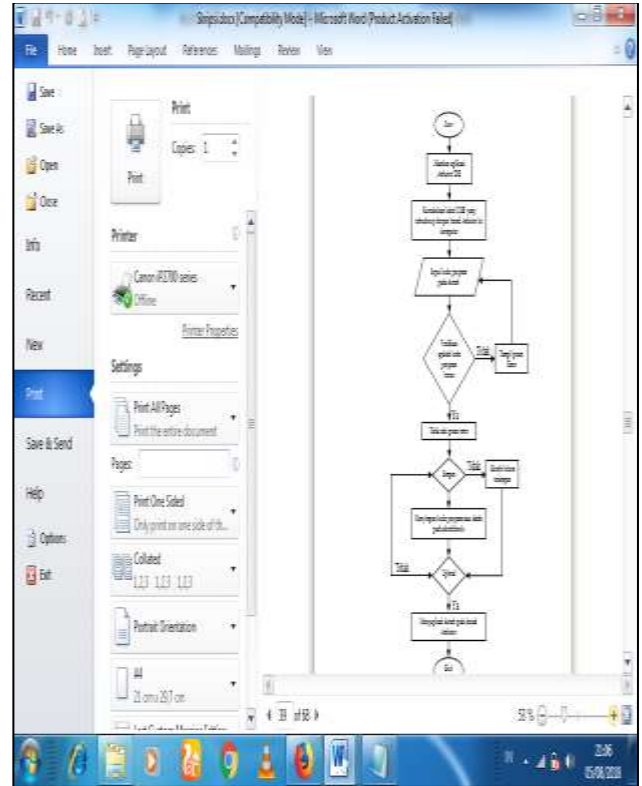
Based on the case, so the researchers design a system which can be used by the farmers to keep the water salinity and to improve the harvest result. The system will be used by the farmers to control water in dike although they are not directly in location of seaweed dike, because the dike water is directly controlled by Ph sensor and Microcontroller automatically. The farmers only observe the condition of water through computer, without worrying about the water from out of river whether the condition of its salinity is high or low.

Below is implementation designing of application at the field (prototyping):



PICTURE 1. THE PROPOSED DESIGNING

**D. The flow chart of software designing on Arduino**



PICTURE 2. FLOW CHART OF ARDUINO DESIGNING

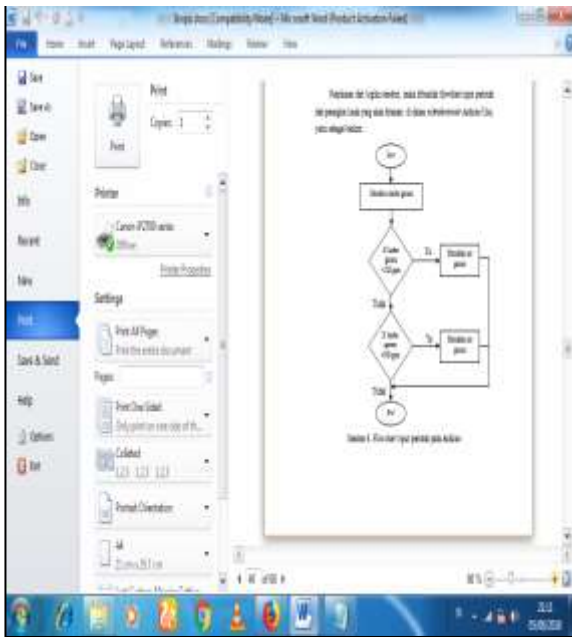
The first step that must be conducted was by determining the logic which would be applied on DC motor that would be controlled, then made algorithm that would be implemented by using Arduino IDE.

TABLE 1 LOGIC OF DC MOTOR

Instruction	DC 1 Motor	DC 2 Motor	Condition	Status
1	ON	-	Low	ON
2	ON	-	Normal	OFF
3	-	ON	High	ON
4	-	ON	Normal	OFF

Source: Research Result

From the explanation of the logic, so there is flow chart of instruction input from software that would be planted in *microcontroller* Arduino Uno, as follow:



PICTURE 3. INSTRUCTION INPUT ON ARDUINO

#### IV. RESULT AND DISCUSSION

Based on the findings about a designing and controller application of salinity level on dike, in this research, there are some cases that must be prepared, they are:

##### A. Hardware used

The hardwares are arduino, sensor of salinity level, laptop, DC motor pump, a portable electrical storage device (battery 3,5 ampere), relay, and bread board.

- 1) **Arduino** is microcontroller of single-board which is open-source that has its own programming language.
- 2) **Censor of salinity level** or commonly called conductivity censer a censer used to measure the level of salinity in the water, where in the censer produces output of analog number with 5 Volt.
- 3) **The pump used to flow water into miniature seaweed dike** is motor from Fuel Pump Injection of motorcycle one of fabricating marks of Yamaha.
- 4) **A portable electrical storage device** is used to supply intensity 12 Volt to DC pump motor used to pump brine and fresh water into miniature of seaweed dike.
- 5) **Relay** is used to measure the flow of hardware arduino to DC motor used to pump water.

##### B. Process of making

There are some steps conducted in the process of making prototyping from designing proposed. The steps are: process of making a series of tools of fritzing 0.9.2 application, process of making miniature of seaweed dike, process of making miniature of house, process of making miniature of collecting and saving brine and fresh water installing of prototype.

The reference of salinity level in this research was if the salinity level < 520 ppm so the salinity level was low, if 520-580 ppm so the salinity level was stable and if the salinity level

> 580 ppm so its salinity level was high. The reference was taken from the result of the research for 30 days with some dikes as samples.

##### C. Testing

V. **System testing** is process of executing the software to determine whether the system qualified the specification system and proceed based on what is expected. In this step, testing system used was black box testing. Below is the result of testing:

TABLE 2 THE RESULT OF TEST

No	Pemeriksaan	Cara Operasi	Hasil yang diharapkan	Hasil Pengujian
1	Salinitas air laut	Salinitas air laut	Salinitas air laut	Salinitas air laut
2	Salinitas air tawar	Salinitas air tawar	Salinitas air tawar	Salinitas air tawar
3	Salinitas air laut	Salinitas air laut	Salinitas air laut	Salinitas air laut

##### A. Discussion

Controller application of salinity level at seaweed dike using arduino uses some steps in program coding, below is steps from each process in application:

- 1) **Step to show salinity level.** Automatically showing value of salinity level in a seaweed dike in ppm unit of computer or laptop monitor connected with hardware arduino and salinity level censer.
- 2) **Step to instruct the DC motor to pump the freshwater,** if the condition of salinity level of dike is more than what has been determined, it is >580 ppm, so automatically the pump will flow the water from receiving and collecting fresh water into dike, if the condition of salinity level in dike has been stable or in the value of 520-580 ppm so the pump will automatically stop flow the water into dike.
- 3) **Step to instruct the DC motor to pump the brine.** If the condition of salinity level of dike is more than what has been determined namely <520 ppm, so automatically the pump will flow the water from receiving and collecting brine into dike, if the condition of salinity level in dike has been stable or in the value of 520-580 ppm so the pump will automatically stop flow the water into dike.

#### CONCLUSION

From the result of the research, the researchers can conclude that system proposed is suitable with the result of the research. It is proven by the prototype designing made. While controller application after conducting test is suitable with what is formulated that when there is level of salinity low, stable and high, so the controller system will be functioning.

There are some steps that must be given attention in designing and making controller application of salinity level, they are hardware used and software needed in designing process of UML model, testing and implementation to coding step.

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